

## African Leptopodomorpha (Hemiptera: Heteroptera): a checklist and descriptions of new taxa

by

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### SYNOPSIS

The Leptopodomorpha of Africa are briefly reviewed and a checklist provided. Four new taxa are described: *Capitonisalda* gen. n., with *ripa* (Drake) as type-species, from Africa and Aden; *Rupisalda thika* sp. n., *Rupisalda speciosa* sp. n., and *Velleriola kenyana* sp. n., all from Kenya.

Keys are provided for the genera of Leptopodidae and Saldidae that occur south of the Sahara, and for the African members of the saldid genus *Rupisalda*.

The zoogeography of African Leptopodomorpha is discussed in the context of our present knowledge.

### INTRODUCTION

This paper is based mainly on material I collected in various African countries in 1979 and 1980, partially supported by a grant from the National Geographic Society. I have also included in the analysis relevant material from the Polhemus Collection and a few other sources.

The Leptopodomorpha of Africa, particularly those from below the Sahara, have been collected and studied in a most haphazard way and unfortunately the present study is far from complete.

The emphasis in this paper is on the fauna of Africa from the Sahel southward, however, a few records from the Sahara are included.

I have compiled a preliminary checklist below with the hope that additions and corrections can be sent to me for inclusion in a later more definitive work. Dr Rene Cobben informs me (personal correspondence) that he will eventually describe new African taxa in this group in addition to those proposed here, thus the checklist will need revision in the foreseeable future.

Whether the Saldidae of Africa are truly depauperate or only poorly collected is not yet clear, however my collecting experiences indicate the former, even in temperate situations that in other parts of the world would harbor a rich saldid fauna. The late Raymond Poisson of France contributed greatly to our knowledge of African aquatic and semiaquatic Hemiptera but did not deal with the Leptopodomorpha in any significant way. I have studied the bulk of his collection, now at the Smithsonian Institution in Washington, and it contains a paucity of relevant material.

### ZOOGEOGRAPHY

The subfamily Leptopodinae of the Leptopodidae is restricted to the Old World with the exception of one introduced species in California. Recent discov-

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eries in the New World led Polhemus (1977) and Schuh and Polhemus (1980) to ally another subfamily, Leptosaldinae, with the Leptopodidae rather than the Saldidae where Cobben (1971) originally placed it; this group, containing two taxa, is known from a total of two specimens, one in Chiapas Amber, the other from a termite nest in Ecuador.

The 26 described Leptopodines range from Europe and Africa to Australia, New Caledonia and the Philippines. Of these 14 occur in Africa, four on mainland Africa below the Sahara, four endemic on Madagascar, the rest in North Africa. Thus about half of the world leptopodid fauna occurs on the African continent, partially as a result of their preferred xeric warm-adapted habitats. The overall distribution of leptopodid taxa worldwide seems to be a result of both dispersal and vicariance biogeography.

There are presently about 250 described species of Saldidae worldwide, ranging from the true Arctic regions and altitudes of 5000 metres to deserts, true tropics and finally the oceans where five genera and eight species are obligatory intertidal. (The family Omaniidae, removed from the Saldidae by Cobben (1970), contains four more strictly intertidal species.) No intertidal leptopodomorphans are known from tropical African sea coasts, but a diligent search of the East African reefs should reveal their presence there because they are widely distributed in the Indian and Pacific Oceans. Omaniidae occur in the Red Sea, and both Aepophilidae and the saldid *Orthophrys pygmaeum* reach Morocco (Polhemus, 1976).

Other kinds of habitats in Africa harbour Saldidae but usually in low numbers. Cold adapted species occur on mountains up to 3000 metres or above, however in my search of many suitable localities on Mount Kenya I saw only one saldid. A similar paucity was seen in other habitats. I have never seen a saldid from Madagascar. Of the perhaps 250 saldid species, only 31 occur on the African Continent and only 18 of these occur below the Sahara. The largest saldid genus, *Saldula*, is primarily cold adapted and has only seven or eight species below the Sahara, most of them endemic to restricted areas as far as we know. Two species (*niveo-limbata* and *ornatula*) have extremely wide distributions, however, roughly paralleling the Old World distribution of the saldid genus *Rupisalda* with the exception of Japan. These are vagile species that have evidently dispersed, but their continent of origin is not evident.

The genus *Rupisalda* is worldwide in the tropics and has seven African species; there are 12 American species and perhaps 12 more scattered on the Comores, Sri Lanka, Java, New Guinea, northern Queensland, the Philippines, the Ryukyus and Japan. This distribution argues for both vicariance and dispersal.

The genus *Capitonisalda* has perhaps five species and is known only from Africa and Aden. It may be allied to two undescribed genera from Australia, but this possible vicariant relationship must be tested by a cladistic analysis.

#### CHECKLIST

In the checklist given here, I have indicated doubtful generic placements with a question mark (?) preceding the species; unconfirmed synonymies are listed with a question mark following.

## Preliminary Checklist of African Leptopodomorpha

## Family Aepophilidae Puton 1879

- Genus *Aepophilus* Signoret, 1879  
*bonnairei* Signoret, 1879—Morocco; Spain; Portugal; France; England

## Family Leptopodidae Costa, 1838

The checklist published by Drake & Hoberlandt 1950*a* is the primary reference. Only nomenclatural changes after that date are given.

- Genus *Erianotus* Fieber, 1861  
*lanosus* (Dufour), 1834—S. Europe; N. Africa; S. W. Asia
- Genus *Leptopus* Latreille, 1809  
*hispanus* Rambur, 1840—Europe; N. Africa; Canary Islands  
*horvathi* Drake & Hottes, 1950—Madagascar  
*marmoratus* (Goeze), 1778—Europe; N. Africa
- Genus *Martiniola* Horvath, 1911  
*madagascariensis* (Martin), 1897—Madagascar  
*pulla* Drake, 1955—Madagascar
- Genus *Patapius* Horvath, 1912
- Subgenus *Patapius* Horvath, 1912  
*corticalis* Linnavouri 1974—Sudan  
*integerrimus* Linnavouri 1974—Sudan  
*sentus* Drake & Hoberlandt, 1950—Egypt  
*spinus* (Rossi), 1790—S. Europe; N. Africa: USA (California; introduced)
- Subgenus *Pseudopatapius* Drake & Hoberlandt, 1951  
*africanus* Drake & Hoberlandt, 1951—Angola  
*angolensis* Drake & Hoberlandt, 1951—Angola
- Genus *Valleriola* Distant, 1904  
*assouanensis* (Costa), 1875—Egypt; Ceylon; Persia; India; New Caledonia  
*kenyana* Polhemus sp. n.—Kenya  
*moesta* Horvath, 1911—Africa (from Kenya, Uganda and Zambia south to Cape Prov., S. Africa); Java  
*strigipes* (Bergroth), 1891—Madagascar

## Family Omaniidae Cobben, 1970

- Genus *Omania* Horvath, 1915  
*coleoptrata* Horvath, 1915—Arabia; Egypt; Pakistan

## Family Saldidae Costa 1852

The checklist published by Drake & Hoberlandt 1950*b* is the primary reference. Only nomenclatural changes after that date are given.

- Genus *Capitonisalda* Polhemus gen. n.  
 ? *actaea* (Drake), 1963—Zaire  
*carayoni* (Drake), 1956—Cameroon

- jihafana* (Brown), 1951—Aden, Ethiopia = *aethiopica* (Carlini), 1895  
?—Ethiopia  
*ripa* (Drake), 1961—South Africa
- Genus *Chartoscirta* Stal, 1868  
*cincta* (Herrich-Schaeffer), 1842—Europe; Siberia; N. Africa;  
Uganda; S. W. Asia  
*cocksii* (Curtis), 1835—Europe; Siberia; S. W. Asia; N. Africa
- Genus *Chiloxanthus* Reuter, 1891  
*pilosus* (Fallen), 1807—Europe; Siberia; N. Africa
- Genus *Halosalda* Reuter, 1912  
*concolor* Puton 1880—Tunisia  
*lateralis* (Fallen), 1807—Europe; N. Africa (?)  
var. *pulchella* (Curtis), 1835
- Genus *Orthophrys* Horvath, 1915  
*pygmaeum* (Reuter), 1912—Portugal; Morocco
- Genus *Pentacora* Reuter, 1912  
*sphacelata* (Uhler), 1877—S. Europe; N. Africa; USA; W.I.; Mexico;  
Middle America; Galapagos. Syn. *iberica* Wagner, 1953
- Genus *Rupisalda* Polhemus, 1981  
*africana* (Drake), 1954—Kenya; Malawi; South Africa; Tanzania;  
Uganda
- ? *araria* (Drake), 1963—Congo = *africana* (Drake) ?  
*capicola* (Drake), 1954—Sierra Leone; South Africa  
*machadoi* (Drake), 1960—Angola; Kenya  
*speciosa* Polhemus sp. n.—Kenya  
*thika* Polhemus sp. n.—Kenya  
*waltoni* (Cobben & Polhemus), 1966—Sierra Leone
- Genus *Saldula* Van Duzee, 1914  
*arenicola* (Scholtz), 1848—Europe; N. Africa; Asia Minor; S. W. Asia  
var. *connectens* (Reuter), 1895  
var. *deserticola* Wagner, 1958  
var. *sahariana* Filippi, 1957  
*c-album* (Fieber), 1859—Europe; N. Africa; N. America; Siberia  
*katonai* Drake & Hoberlandt, 1950—Ethiopia  
*lita* Drake, 1961—South Africa (Cape Province)  
*montana* Cobben & Polhemus, 1966—Kenya; Tanzania  
*niveo-limbata* (Reuter), 1900—Africa (Gold Coast, Nigeria, Senegal,  
Sierra-Leone, South West Africa, Tanzania, Zaïre); Cape Verde  
Islands; Seychelles; Vietnam; American Samoa; Western Samoa.  
Syn. *insignis* (Distant), 1913  
*notera* Drake, 1963—Zaïre  
*ornatula* (Reuter), 1881—Africa (from North Africa to South Africa);  
India; China; Philippines; Vietnam; Sri Lanka; Australia  
*pallipes* (Fabricius), 1794—Europe; Asia; Africa; The Americas  
(See Polhemus 1981 for synonymy)

*palustris* (Douglas), 1874—Europe; N. Africa; Middle East; Caucasus  
 var. *sardoa* Filippi, 1957. Syn. *ancestralis* Filippi, 1957; syn. *mutabilis*  
 (Reuter), 1891; syn. *pallidipennis* (Reuter), 1888  
*saltatoria* (Linnaeus), 1758—Europe; N. Africa; Asia; N. America  
*setulosa* (Puton), 1880—N. Africa; Turkestan  
*variabilis* (Herrich-Schaeffer), 1835—Europe; N. Africa; S. W. Asia  
*xanthochila* (Fieber), 1859—Europe; South Africa; Caucasus; Iraq  
 var. *babylonica* Filippi, 1957  
 var. *bimaculata* Filippi, 1957  
 var. *expansa* Filippi, 1957  
 var. *obscurata* Filippi, 1957

## TAXONOMY

In this section notes are provided on collection data and nomenclatural changes. In the description of new taxa, 60 units equals 1 mm unless otherwise noted. I am indebted to various colleagues for the loan or gift of material. The abbreviation following each acknowledgement will be used to indicate disposition of material. If no disposition is indicated, the material is in the Polhemus Collection. I am indebted to: R. H. Cobben, Wageningen; W. R. Dolling, British Museum (Natural History) (BMNH); R. T. Schuh, American Museum of Natural History (AMNH). Distribution of specimens will include the foregoing, the U. S. National Museum, the Natal Museum and the National Museum of Kenya.

## Family SALDIDAE

## Key to Genera of Saldidae of Africa south of the Sahara

- 1 Second tarsal segments of all legs bearing 6–8 stout dark spines in each of two rows (See Fig. 1A) ..... **Capitonisalda** gen. n.
- 
- Second tarsal segments bearing at most 3–4 stout dark spines in each of two rows usually only on posterior tarsi ..... 2
- 2 Hypocostal region with only a simple ventrally directed ridge (h) ..... **Rupisalda** Polhemus
- Hypocostal region with a secondary ridge (s) reaching obliquely from the inner wing base to the middle of the costal margin, overlying h (see Fig. 1C) ..... **Saldula** Van Duzee

Genus **Capitonisalda** gen. n.

*Derivation:* *Capitonis* (L.) = One with a large head + *Salda*.

*Gender:* Feminine

*Type-species:* *Saldula ripa* Drake 1961b

*Description:* Ground color brown-black to black; light markings on lateral margins of pronotum extensive to evanescent; light markings on clavus, corium and embolium usually well-developed, always present. Abdominal sternites margined with yellow to mostly yellow. Head with frons faintly rugulose, vertex smooth, with very fine to coarse recumbent pubescence; broad, width 62% to 75% of

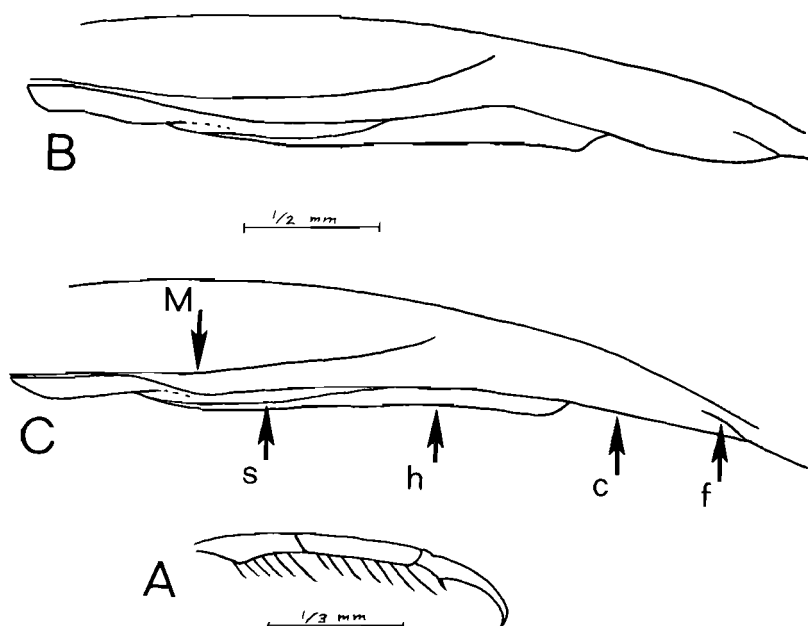


Fig. 1. *Capitonisalda* gen. n. A–B. *Capitonisalda ripa* (Drake). A. Anterior tarsus, lateral view, showing one row of spines. B. Side view of hemelytra and details of costal region. C. *Capitonisalda jihafana* (Brown), side view of hemelytra and details of costal region: c, costal margin; f, fracture; h, hypocostal ridge; M, M-vein; s, secondary hypocostal ridge.

greatest pronotal width. Antenna long, slender, with very short recumbent setae and scattered short erect setae not longer than width of segment where they arise.

Length 4.2 to 6.2 mm; width 1.8 to 2.8 mm. Head free from thorax, eyes exserted; head strongly declivant; ratio, width of eye/interocular space, 0.80 to 1.0; ocelli barely raised from level of vertex; postclypeus not tumid, weakly sulcate longitudinally; transverse swelling well-developed.

Pronotum short, about  $1\frac{1}{2}$  times as long as head on midline, anteriorly narrowed, broadly indented along posterior margin anterad of scutellum; callus strongly raised, median pit well-developed, set off from posterior lobe by row of pits not reaching lateral margins. Collar well-developed, set off from callus by row of pits in sulcus. Posterior tibial comb poorly developed. No stridulatory mechanism evident.

Hemelytra elongate to ovate, lateral margins weakly concave basally, all species macropterous to submacropterous; embolar fracture present, typical of Saldinae; embolar modification of female not evident dorsally; venation of corium not evident; membrané long, well-developed, with four cells; hypocostal ridge well-developed, weak posteriorly in males, moderately to strongly developed posteriorly in females; secondary hypocostal ridge present, meeting costal margin near midpoint between wing base and costal fracture; female costal margin moderately to strongly reflexed medially; hind wings well-developed, reaching beyond apex of abdomen.

Nymphal abdominal scent glands well-developed without lateral channels; larval organ very large, scar plainly visible in adults. Female second gonapophysis

truncate apically, not sharp; connecting piece of styloids attached (*jihifana*); ring gland of gynatrium plainly sclerotised; spermatheca with single distal pump flange. Male filum gonopori coiled two and one-half times; processus sensualis of paramere very weakly developed, indistinct (see Figs 2D and 2E, Cobben & Polhemus, 1966).

*Discussion:* *Capitonisalda* may be easily distinguished by the large number of stout dark spines on all tarsal segments, especially the second tarsal segment of each leg with 6–8 stout spines in each of two rows; other saldid genera have no more than two or three dark spines in similar rows. The secondary hypocostal ridge is similar to that seen in the cosmopolitan genus *Saldula*, and separates both genera from *Rupisalda*. All of these genera have saxicolous species, but *Rupisalda* and *Capitonisalda* are exclusively so and the latter lives on wet vertical substrates such as the spray zone below waterfalls.

*Capitonisalda* includes, in addition to the type species *ripa* (Drake), *jihafana* (Brown) *carayoni* (Drake) and probably *actaea* Drake but as I have not examined the types of the latter I cannot include it with certainty. All of the above species were originally placed in the genus *Saldula*. Dr Cobben informs me that he has studied the type of *Saldula aethiopica* (Carlini) and that it is synonymous with *jihafana* (Brown).

#### *Capitonisalda actaea* (Drake) ?

*Saldula actaea* Drake 1963. *Rev. Zool. Bot. Afr.* 67: 2.

My specimens from Kenya and Malawi match the description of *actaea*, described from the region of Lake Kivu on the Zaïre–Rwanda border. I have not examined the type series, so the generic placement of this species in *Capitonisalda* is provisional, and my identification of this species as *actaea* is also provisional. I have taken a conservative course to avoid burdening the literature with another synonym. From the descriptions, it also seems quite possible that *actaea* may be a synonym of '*Saldula carayoni* Drake (1956), which I have also provisionally assigned to *Capitonisalda*.

*Material examined:* KENYA: 14 ♂, 5 ♀, 14 Falls, E. of Thika, CL1652, I–30–80, On Spray zone below waterfall, J. T. Polhemus. MALAWI: 1 ♀, Zomba, cascade, CL984, II–28–79, J. T. Polhemus.

#### *Capitonisalda jihafana* (Brown)

*Saldula jihafana* Brown, 1951. *Brit. Mus. (Nat. Hist.) Exped. to S. W. Arabia 1937–8*, London 1(17): 241.

Cobben & Polhemus (1966) treated material from Ethiopia, Sierra Leone and South Africa as *jihafana* and suggested that *ripa* Drake might be a synonym. My analysis based on the more voluminous material now available shows that there are several species in *Capitonisalda*. The Ethiopian specimens can provisionally be assigned to *jihafana*, originally described from Aden, whereas the South African specimens are all *C. ripa*; I have not restudied the specimen from Sierra Leone.

I am indebted to W. Dolling (BMNH) and R. Cobben respectively, for making available two male paratypes of *jihifana* from Aden and fresh material from Ethiopia.

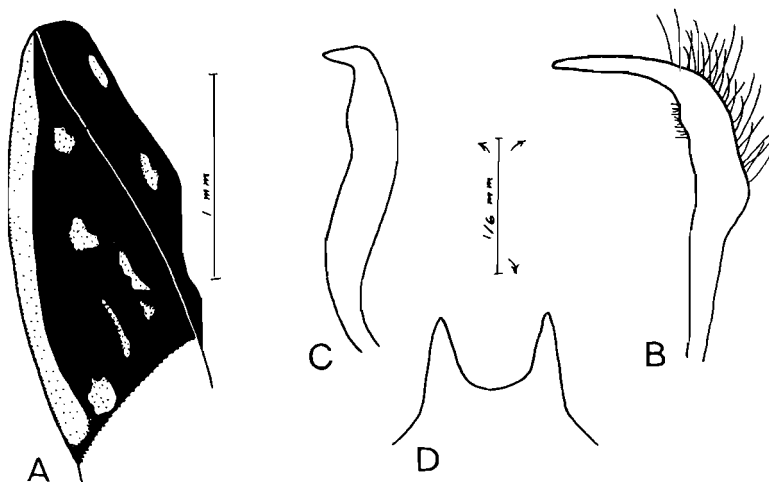


Fig. 2. *Rupisalda speciosa* sp. n. A. Pattern of hemelytra—membrane not shown. B—C. Left male paramere, two views. D. Parandria.

*Material examined:* ADEN: 2 ♂ paratypes, W. Aden Prot., Jebel Jihaf., Wadi Leje, ca. 5600 ft., 18.x. 1937, B.M. Exp. to S. W. Arabia. ETHIOPIA: 2 ♀, Mulu, above Muger Valley, ca. 8000 ft, 18–23.x.11, 1926, Dr H. Scott (BMNH, JTP); 1 ♂, Sakka, 20 km. z. van Jimma, Waterfall, 19–10–69, leg. R. H. Cobben; 1 ♂, 2 ♀, Jimma, 70 km. richting Addis Ababa 23–10–69, leg. R. H. Cobben.

*Capitonisalda ripa* (Drake)

*Saldula ripa* Drake, 1961. *Trans. roy. Soc. S Afr.* 36: 133.

Cobben & Polhemus (1966) identified specimens of *ripa* as *jihafana* and questioned the validity of *ripa*. I was fortunate in collecting a series of *ripa* in a shaded, very wet splash zone under a small waterfall in South Africa. I also have before me females from three other South African localities as given below.

All *ripa* females have the distal part of the hypocostal ridge strongly produced into a ventrally directed lamina that terminates abruptly just before the embolar coupling region, and the costal margin arcuate above the lamina (Fig. 1B). In females of *jihafana* from Ethiopia the hypocostal ridge and costal margin are very differently formed (Fig. 1C) and not greatly modified; this latter form is also seen in *actaea* (?) females from Kenya and Malawi: Differences in the male parameres of *ripa* and *jihafana* are illustrated in Cobben & Polhemus (1966; Fig. 2, D and E).

*Material examined:* SOUTH AFRICA: 1 ♀, East Cape Province, Maclear, 9 May 1956, No. 276, J. Omer-Cooper; 1 ♀ paratype, Natal, Umgeni Valley, Bothas Hill, Nov. 1958, B. & P. Stuckenberg; 1 ♀, Natal, Royal Natal Nat. Pk., The Cascades, 5100 ft., 4–5 Mar. 1968, #203, T. Schuh, J. A. & S. Slater, M. Sweet, J. Munting (AMNH); 5 ♂, 2 ♀, 1 nymph, Natal, Clifton Canyon, N. of Durban, C 942, II–14–79, J. T. Polhemus. 1 ♂, near Lilani, Ahrens district,



Apr. 1962, B. & P. Stuckenberg; 1 ♀, Gladdespruit River, headwaters at Kaapsehoop, 7 Nov. 1970, Stuckenberg.

### Genus *Rupisalda* Polhemus

*Rupisalda* Polhemus 1981. Saldidae—A world overview and taxonomy of Mexican and Middle American forms, approx. 262 pp. (in press).

This genus was restricted by Polhemus (1981) to the Americas, so the inclusion of Old World species is a new concept. Originally I thought that the African fauna here included in *Rupisalda* might be comprised of more than one genus. However, with the removal of species of *Capitonisalda* and *Saldula* from the obligatory saxicolous African saldids, the remaining assemblage settles comfortably into the genus *Rupisalda* as originally characterised.

### Key to African Species of *Rupisalda* Polhemus

- 1 Dorsum of hemelytra thickly set with erect black setae at least as long as width of posterior tibia at middle ..... 2
- Dorsum of hemelytra with short recumbent to semi-recumbent setae not as long as width of posterior tibia at middle ..... 3
- 2 Dorsum of hemelytra and posterior tibia with erect black setae twice as long as width of posterior tibia at middle; costal margin hairy, without stridulatory striations ..... **machadoi** (Drake)
- Dorsum of hemelytra with erect black setae subequal in length to, and setae on posterior tibia much shorter than width of posterior tibia at middle; costal margin not hairy when viewed from above, with obvious strigil (fine serrations) ..... **africana** (Drake)  
(= *araria* (Drake)?)
- 3 Embolium usually pale coloured basally, medially and distally (Fig. 3A–B); tibia mostly piceous, narrowly yellowish ventrally and distally ... **thika** sp. n.
- Embolium pale coloured throughout of dark distally and more or less interrupted with fuscous at distal three-fourths, sometimes margined with fuscous, but never with three distinct light streaks; tibia fuscous dorsally and yellowish ventrally, or mostly yellowish, but never mostly piceous ..... 4
- 4 Costal margins with a strigil (fine serrations); posterior femur with plectrum (peg field) ventrally beyond middle ..... **speciosa** sp. n.
- Costal margin without strigil; posterior femur without plectrum ..... 5
- 5 Clavus with proximal pale streak in addition to distal pale spot; corium with coarse golden and black semi-recumbent pubescence ..... **capicola** (Drake)
- Clavus without proximal pale streak; corium with only fine black semi-recumbent pubescence ..... **waltoni** (Cobben & Polhemus)

### *Rupisalda africana* (Drake)

*Saldula africana* Drake, 1954. *J. Wash. Acad. Sci.* **44**: 196.

Cobben & Polhemus (1966) noted the close relationship between *africana* and *capicola*, and stated that the hairy dorsum of *africana* was the only distinguishing characteristic. (The dorsal setae in *africana* are subequal to the width of the fore femur, much shorter in *capicola*.) Closer examination reveals that *africana* has a

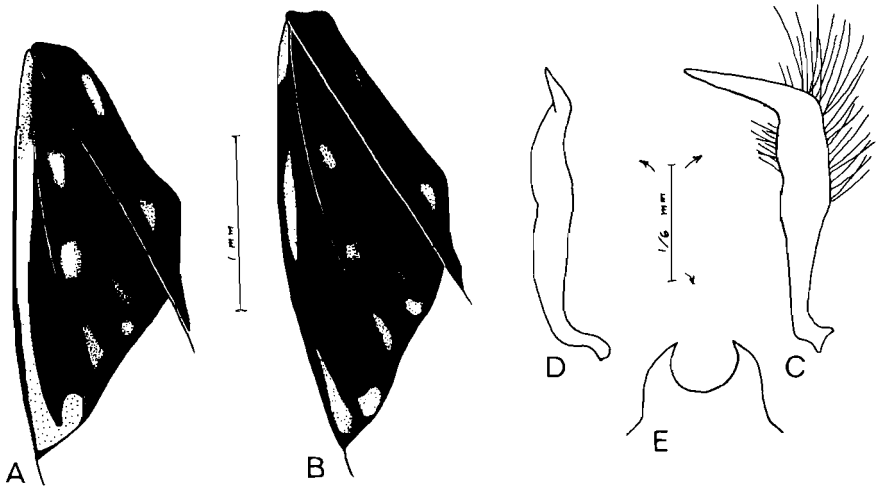


Fig. 3. *Rupisalda thika* sp. n. A. Eunoemy of hemelytra, membrane not shown. C-D. Left male paramere, two views. E. Parandria.

very well-developed stridulatory mechanism consisting of an obvious strigil (row of fine serrations) along the costal margin, and a plectrum (peg field) medially on the posterior femur. This stridulatory mechanism is completely lacking in *capicola*, however the costal margin is hair free and has very fine irregularities.

*Rupisalda machadoi* has many long setae projecting laterally beyond the costal margin, thus a strigil could not develop there.

*Rupisalda africana* is very widespread and perhaps the commonest saldid in tropical to warm temperate Africa.

**Material examined:** KENYA: 3 ♂, 2 ♀, Kericho Dist., Kericho, CL1663, II-4-1980, J. T. Polhemus; 3 ♂ 1 ♀, Laikipia Dist. Naromoru River, CL 1655, I-31-1980, J. T. Polhemus; 2 ♂, 1 ♀, 1 nymph, Machakos Dist. 28 km. N. Nairobi, Thika Falls, II-20-1948, F. X. Williams (AMNH, JTP); 5 ♂, 2 ♀, Taita Dist., Kivoto Forest nr. Taveta, CL1671, II-7-1980, J. T. Polhemus. MALAWI: 5 ♂, 3 ♀, 2 nymphs, S. of Limbe, Mpendi Tea Plantation, CL989, III-2-1979, J. T. Polhemus; 1 ♂, Zomba, CL984, II-28-1979, J. T. Polhemus; 28 ♂, 8 ♀, 2 nymphs, Zimba Plateau, Mandala Falls, CL986, III-1-1979, J. T. Polhemus. TANZANIA: 15 ♂, 7 ♀, Dodwe Stream nr. Amani, ca. 1000M, CL 992, III-6-1979, J. T. Polhemus; 1 ♀, 1 nymph, Amani, Sigi River, CL999, III-13-1979, J. T. Polhemus. SOUTH AFRICA: 1 ♀, S. Afr., Tag 97P16, 14.v. 1957; Cape Province: 1 ♂, King William's Town, Maden Dam, III-25-1951, J. Balfour-Brown; 1 ♂, 1 ♀, Hogback, CL962, II-20-1979, J. T. Polhemus; 1 ♂, 36km W. Rhodes, CL961, II-20-1979, J. T. Polhemus. Natal: 1 ♂, Gillitts, Pinetown Dist. X1-21-1963, B. & P. Stuckenberg; 1 ♂, 1 ♂, 28 mi WSW Durban, IV-17-1968, J. A. & S. Slater, T Schuh; 5 ♂, 12 ♀, Clifton Canyon, N. of Durban, CL942, II-15-1979; 8 ♂, 8 ♀, 2 nymphs, Karkloof Falls, Nr. Howick, CL940, II-13-1979, J. T. Polhemus; 3 ♂, 1 ♀, 3 nymphs, Sani Pass, Drakensberg, CL952, 2000 m., II-18-1979, J. T. Polhemus. 1 ♂, near Lilani,

Ahrens district, Apr. 1962, B. & P. Stuckenberg, Transvaal: 1 ♂, Sabie District, II-24-1971, Stuckenberg. UGANDA: 1 ♀, Ruwenzori Range, Namwamba Valley, 66 500 ft. X-11-1934. I-1935, B. M. E. Afr. Exp., B. M. 1935-203, F. W. Edwards (BMNH).

*Rupisalda capicola* (Drake)

*Saldula capicola* Drake, 1954—*J. Wash. Acad. Sci.* **44**: 196.

This species is prevalent in the Cape Region and parts of Natal in South Africa, but apart from the specimens reported from Sierra Leone, it has not been found in other African countries. Over much of warm temperate to tropical Africa, this species is replaced by *Rupisalda africana*, and the two were collected together at Sani Pass in the Drakensberg (see notes under *africana* for separation of the two species).

*Material examined*: (In addition to that reported by Cobben & Polhemus, 1966.) SOUTH AFRICA: Cape Prov.: 76 specimens, Stormsriver Pass, CL964, II-22-1979, J. T. Polhemus; 4 ♂, 7 ♀, Varkriver Pass, W. of Stormsriver, CL966, II-22-1979, J. T. Polhemus; 4 ♂, 1 ♀, Bains Kloof, E. of Wellington, CL979, II-25-1979, J. T. Polhemus; Natal: 1 ♂, 2 ♀, 1 nymph, Sani Pass, Drakensberg, 2000 m, CL952, II-18-1979, J. T. Polhemus; 1 ♂ 4 ♀, Karkloof Range, Geekies Farm, 1500 m, XI-17-1963, Stuckenberg.

*Rupisalda machadoi* (Drake)

*Saldula machadoi* Drake, 1960. *Publ. cult. Co. Diam. Ang., Lisboa* **51**: 71.

Heretofore known only from the type series from Angola, which includes paratypes not mentioned by Drake (1960). This species is widespread and rather abundant in Kenya. Its preferred habitat is on large stones in good sized streams.

*Material examined*: ANGOLA: 1 ♀, paratype, No. 10962.3, Nr. Dundo, A. Barros Machado. KENYA: Machakos Dist.: 7 ♂, 3 ♀, Stony Athi River, E. of Athi River Station, CL1651, I-29-1980, J. T. Polhemus; 8 ♂, 3 ♀, 14 Falls, E. of Thika, CL1652, I-30-1980, J. T. Polhemus; Narok Dist.: 2 ♂, 1 ♀, Mara River, N. edge Masai Mara Game Reserve, CL1669, II-5-1980, J. T. Polhemus.

*Rupisalda speciosa* sp. n.

*Macropterous male*: Ground colour black; head rugulose, faintly shining; pronotum, scutellum faintly rugose, shining; lateral pronotal margins luteous medially, spot as wide as first antennal segment; hemelytra dull, with large blue-black faintly shining areas on basal angle of outer corium and along apex of clavus on inner corium, light markings leucine to luteous, embolium completely luteous except narrowly dark at fracture (Fig. 2A). Venter black, anterior and middle acetabular markings leucine; legs luteous, dorsally embrowned, femora medially with brown markings, knees and tibia distally dark; antennae fuscous, first segment extensively luteous. Dorsum covered with fine dark recumbent setae, never longer than width of fore tibia; without long setae. Hemelytra membrane with four cells as in all *Rupisalda* species; membrane dusky.

Head with postclypeus barely tumid, faintly depressed medially; transverse swelling moderately developed, evanescent laterally; antennal segment one stout, distal three long and slender. Lateral pronotal margins straight, convergent anteriorly, explanate on luteous area, not set off from pronotal disc by distinct sulcus. Scutellum barely raised, without apical tumescence.

Total length, 3,5 mm; width across hemelytra, 1,6 mm. Head length, 26; width 57; interocular space, 18. Pronotum length, 27; posterior width, 80; anterior width, 42; collar width, 37; callus length, 15; posterior lobe length, 9. Scutellum length, 46; width, 52. Hemelytra corium length, 126; clavus length, 90; claval commissure length, 31; distance apex claval commissure—apex membrane, 88. Metafemur length, 86; metatibia length, 123. Antennal segments, length 1,20; 2, 47; 3, 37; 4, 36.

Genitalia as in Fig. 2B–D.

Female unknown.

*Material examined:* Holotype, ♂, KENYA, Kericho District, Kericho, Stream on Tea Hotel grounds, CL1663, II–4–1980, J. T. Polhemus, in Polhemus Collection. (When additional material is available, the holotype will be transferred to the National Museum of Kenya, Nairobi.)

*Etymology:* The name is from the Latin word *speciosus*, beautiful. Gender, feminine.

*Discussion:* *R. speciosa* may be easily separated from its congeners by the large head in relation to the greatest width of the pronotum, straight pronotal margins, lack of long dorsal setae and very evident stridulatory mechanism. This combination of characters separates it at once from *africana* which also has a pronounced strigil on the costal margin. *R. waltoni* is the same size but lacks a stridulatory mechanism and has curved pronotal margins.

#### ***Rupisalda thika* sp. n.**

*Macropterous male:* Ground colour black; head, pronotum, scutellum glabrous, postclypeus transversely rugulose; lateral pronotal margins luteous on anterior two-thirds, width of marginal stripe subequal to width of tibia; hemelytra dull, outer corium faintly shining, light markings leucine to testaceous; eunomy as in Fig. 3A–B. Venter brownish black to black, acetabular margins leucine; legs mostly black with yellow to testaceous markings; trochanters light; femora entirely yellowish in lightest specimens; fore femora almost entirely black, middle and posterior femora extensively marked with black in darkest specimens; tibia with yellowish annuli distally, anterior tibia dark dorsally; tarsi testaceous to brown; antennae black, first segment feebly marked beneath with testaceous in lightest coloured specimens. Dorsum thickly clothed with short recumbent brownish pubescence not longer than width of tibia, without long setae except a few on vertex of head.

Head with postclypeus barely tumid, depressed medially; transverse swelling well-developed, strongly raised; antennal segment one stout, distal three long and slender. Lateral pronotal margins slightly convex, almost straight medially, con-

vergent anteriorly, not explanate, not set off from posterior lobe by distinct sulcus. Scutellum barely raised, posterior lobe with very slight tumescence apically.

Total length in mm,  $n = 10$ ,  $\bar{x} = 4,19$ ,  $s = 0,14$ . Greatest width in mm,  $n = 10$ ,  $\bar{x} = 1,79$ ,  $s = 0,04$ . Head length, 23; width, 55; interocular space, 17. Pronotum length, 26; posterior width, 93; anterior width, 43; collar width, 37, callus length, 13; posterior lobe length, 11. Scutellum length, 63, width, 63. Hemelytra corium length, 142; clavus length, 102; claval commissure length, 35; distance apex claval commissure-apex membrane, 114. Metafemur length, 73; metatibia length, 117. Antennal segments, length 1, 20; 2, 42; 3, 36; 4, 32.

Genitalia as in Fig. 3C–E.

*Macropterous female*: Similar to male, except slightly larger and with yellowish markings on hemelytra generally less extensive. Total length in mm,  $n = 10$ ,  $\bar{x} = 4,72$ ,  $s = 0,25$ . Greatest width in mm,  $n = 10$ ,  $\bar{x} = 2,03$ ,  $s = 0,08$ .

*Material examined*: Holotype, ♂, and allotype, ♀, KENYA, Machakos District, 14 Falls, E. of Thika, CL 1652, I–30–1980, J. T. Polhemus. Also, paratypes as follows: 11 ♂, 16 ♀, same data as holotype; 1 ♂, 2 ♀, Kericho District, SW of Kericho, CL1664, II–4–1980, J. T. Polhemus. The holotype and several paratypes will be deposited in the National Museum of Kenya, Nairobi; the allotype and paratypes are in the Polhemus collection. Additional paratypes will be deposited in the American Museum of Natural History, United States National Museum, and California Academy of Sciences.

*Etymology*: This species is named for Thika, the Kenyan village close to the type locality at 14 Falls.

*Discussion*: *Rupisalda thika* sp. n. is easily separated from its congeners by the twice interrupted flavous stripe on the embolium, evident in all but a few males, and by other characters as given in the key. It is closest to *R. waltoni* (Cobben & Polhemus) and *R. capicola* (Drake). *R. waltoni* is a much smaller species with proportionately larger yellowish markings, and *R. capicola* has rather coarse yellowish pubescence on the hemelytra lacking in *thika*.

#### *Saldula arenicola* (Scholz)

*Salda arenicola* Scholz, 1847. *Ueberisch. Arb. Verand. Schlesischen Ges. Vaterl. Kultur* 1846: 110.

Cobben (1959) discussed the variability of *Saldula arenicola* and concluded that Wagner's *Saldula deserticola* is a pale form of this species. My series show a great variability in the pale markings, and tend to confirm Cobben's viewpoint.

*Material examined*: ALGERIA: 12 ♀, 15 ♀, Imalaoulaouene, Nr. Tamanrasset, CL1685, II–28–1980, J. T. Polhemus; 2 ♂, 5 ♀, Oued Sakarassene, Hoggar, CL1683, II–26–1980, J. T. Polhemus.

#### *Saldula lita* Drake

*Saldula lita* Drake 1961. *Trans. roy. Soc. S. Afr.* 36: 134.

The type locality of this species is Stormsriver Pass, a deep gorge in the Tsitsikama Forest that opens onto the seacoast. I collected many interesting

species at this locality, but not *S. lita*. I speculate that the favoured habitat is on rock face seeps in the gorge proper which is rather difficult to reach from the old road that leads to the pass.

Later I found this species in numbers at Orange Kloof on Table Mountain near Cape Town. The preferred habitat was a south facing rockface wetted by seep springs; while steeply sloping overall, the rockface consisted of a set of short step-like terraces with many tiny pools and mossy damp areas along with abundant cracks and crevices in which several species of bugs secreted themselves. *S. lita* was found only on horizontal substrates.

*Material examined:* SOUTH AFRICA, Cape Prov.: 1 ♀, Steenbras R. Mouth, CL977, II-24-79, J. T. Polhemus; 55 adults, 6 nymphs, Orange Kloof, Table Mtn., CL982, II-26-79, J. T. Polhemus; 1 ♂, 1 ♀, Cecelia Forest Station Road to top, Table Mtn., CL983, II-26-79, J. T. Polhemus.

### *Saldula montana* Cobben & Polhemus

*Saldula montana* Cobben & Polhemus, 1966. *J. Kansas Ent. Soc.* 39: 394.

This species was described from two males and two females from Tanzania and has not been reported since. The capture recorded below was in nearby Kenya at about 3200 m elevation, considerably higher than the type locality (*ca.* 2000 m). This species should be found on various mountains in East Africa at these elevations.

*Material examined:* KENYA; 1 ♂, Mt. Kenya, damp bare spot in grassy area next to cascading stream, I-31-1980, J. T. Polhemus.

### *Saldula niveo-limbata* (Reuter)

*Acanthia niveo-limbata* Reuter 1900. *Bull. Soc. Ent. France* 1900: 156.

*Acanthia insignis* Distant 1913. *Trans. Linn. Soc. London*, Ser. 2, 16: 170.

*Saldula marianarum* Usinger 1946. *Ins. Guam* 2: 100. *Syn. n.*

I did not collect this species in Africa, but surprisingly I found it to be abundant on the Samoan Islands. Although previously reported from mainland Africa, Cape Verde Islands, Seychelles Islands and Vietnam (Cobben & Polhemus, 1966), the recognition of this species on mid-Pacific Islands was totally unexpected. My specimens from the Samoas match exactly with those from Haute-Volta, Ghana and the Seychelles, and with Usinger's description of *marianarum*. Drake (1961) gave the distribution of *marianarum* as Guam and Palau. The Haute-Volta specimens were taken at UV light, so widespread dispersal by flight is quite likely.

*Material examined:* TANZANIA: 1 ♀, Bwiru, V-20-58, G. A. Walton. GHANA: 2 ♂, Tafo, VII-1-65, D. Leston. SEYCHELLES: 1 ♂, Mahe, Bean Valley, VII-16-52, E. S. Brown. AMERICAN SAMOA: 2 ♂, 4 ♀, Tutuila, rocks in stream, CL1516, I-25-78, J. T. and M. S. Polhemus. WESTERN SAMOA: 30 adults, 3 nymphs, Upolu, Nr. Poutasi, steep bank of stream, CL1508, I-21-78, J. T. and M. S. Polhemus; 22 adults, 8 nymphs, Upolu, Slide Rock, CL1510, I-22-78, J. T. and M. S. Polhemus.

*Saldula ornatula* (Reuter)

*Salda ornatula* Reuter 1881. *Berl. ent. Ztschr.* 25: 160. (See Drake 1960 for further synonymy.)

Drake (1960) gave the publication date of this species as 1844, but Reuter was not born until 1850. This species is extremely widespread in the Old World tropics and warm temperate regions, ranging from Africa to the Philippines and Australia.

**Material examined:** IVORY COAST: 1 ♀, Adiopodoume, V-4-1964, R. H. Cobben. KENYA: Baringo Dist.: 4 ♂, 3 ♀, Lake Baringo, CL1662, II-3-1980, J. T. Polhemus; Laikipia Dist.: 2 ♂, 2 ♀, 1 nymph, Ponds, Naromoru, CL1659, II-1-1980, J. T. Polhemus. SOUTH AFRICA: Cape Province: 1 ♂, Varkriver Pass, W. of Stormsriver, CL966, II-22-1979, J. T. Polhemus; 10 ♂, 3 ♀, 6 nymphs, Oudtshoorn, CL971, II-23-1979, J. T. Polhemus; 9 ♂, 11 ♀, Small lake E of DeRust, W. of Caledon, CL976, II-24-1979, J. T. Polhemus; Natal: 2 ♀, Richards Bay, Small lake, CL945, II-16-1979, J. T. Polhemus.

## Key to Genera of Leptopodidae of Africa south of the Sahara

- 1 First visible rostral segment with two long spines on each side; second visible ROSTRAL SEGMENT flattened, dilated laterally, armed on each side with a slender spine and a setigerous spine .....  
**Patapius (Pseudopatapius) Drake & Hoberlandt.**
- First visible rostral segment with two long spines on each side; second visible rostral segment cylindrical, without spines ..... 2
- 2 Third antennal segment subequal or a little longer than second; dorsum with erect stout setiform spines ..... **Martiniola Horvath**
- Third antennal segment much longer than second; dorsum with erect slender setae, without spines ..... **Valleriola Distant**

*Leptopus hispanus* Rambur

*Leptopus hispanus* Rambur, 1840. *Faune ent. Andalousie* 2: 181.

Horvath (1911) and Drake & Hoberlandt (1951a) list the date of publication for this species as 1842, however Horn and Schenkling give the publication of volume 2, part 5 (pp. 177-212) as 1840. I have followed the latter authority because the original work is not available to me.

**Material Examined:** ALGERIA: 1 ♂, Imalaoulaouene, Nr. Tamanrasset, CL1685, II-28-1980, J. T. Polhemus.

**Valleriola kenyana** sp. n.

**Macropterous female:** Ground colour black; posterior lobe of pronotum, hemelytra except embolium, membrane and median area of clavus, thickly, coarsely punctate; head with clypeus, postclypeus, transverse swelling, vertex medially behind ocelli luteous to orange-yellow; pronotal lateral and posterior margins, median longitudinal stripe on posterior lobe luteous; scutellum luteous apically; hemelytra with embolium, two elongate spots on outer corium near apex, large irregular spot on middle of inner corium, elongate spot on medial vein of clavus, inner margins of clavus and corium yellowish to brownish yellow, markings not

bright; membrane smoky black, veins black, infuscated over apical two-thirds, with four cells, outer cell coriaceous, punctate. Venter black, acetabular margins leucine; legs mostly leucine to yellowish, embrowned dorsally creating distinct longitudinal stripes, middle and posterior tibia also with ventral brown longitudinal stripes. Abdominal ventrites margined with brownish-yellow basally, increasingly paler distally, ventrite 7 dark brown only laterally. Antennae brown; first segment yellowish except dorsally; segment 2 yellowish distally beneath. Dorsum of hemelytra sparsely set with stiff erect setae varying in length from subequal to twice as great as width of posterior femur medially; pronotum with shorter fine curved recumbent setae; legs naked except for very short inconspicuous setae.

Head with postclypeus tumid, deeply longitudinally sulcate medially; ocelli elevated on tubercle. Structure of head, pronotum, scutellum, hemelytra, abdomen and appendages all typical of the genus *Valleriola*. Forelegs with usual stout spines found in *Valleriola* spp., except longest two spines on each fore femur subequal in length to width of femur where they arise. Rostrum with four (2 + 2) long (15–17) stout spines ventrally (pointing upward toward venter of head in normal repose); head beneath with two rows (3 + 3) of long (12–15) stout spines, set mesad of eye margins; anterior acetabulae each set with one forward directed stout medium length (8) spine. Antennal segment one stout, short; distal three segments very long and slender. Pronotal lateral margins convex, convergent anteriorly, narrowly explanate anteriorly.

Total length 5.15 mm; greatest width 1.43 mm. Head length, 40; width, 75; interocular space, 17. Pronotum length, 57; posterior width, 78; anterior width, 37; collar width, 31; collar length, 6; callus length, 20; posterior lobe length, 31. Scutellum length, 33; width, 35. Hemelytra corium length, 190; clavus length, 105; claval commissure length, 55; distance apex claval commissure–apex membrane, 128. Metafemur length, 116; metatibia length, 180. Antennal segments, length 1, 22; 2, 52; 3, 103; 4, 117.

Male unknown.

*Material examined*: Holotype, ♀, KENYA, Machakos District, 14 Falls, E. of Thika, CL1652, 1–30–1980, J. T. Polhemus, in Polhemus Collection. (When additional specimens are available, the holotype will be transferred to the National Museum of Kenya, Nairobi.)

*Etymology*: The name *kenyana* is derived from the country of origin, meaning belonging to Kenya.

*Discussion*: *V. kenyana* can be easily distinguished from all other species of the genus by the dense deep punctures covering the entire hemelytra except a small median area on the clavus. The hairless legs are shared only by *V. wilsonae* Drake from Australia, although *V. buenoi* (Usinger) and *V. mindorana* Drake have only sparse hairs on the fore femora. The latter three species and a species from India (*V. javanica* Drake & Hottes?) share with *V. kenyana* in having an anteriorly directed spine on the anterior acetabulae. I have not studied *V. strigipes* (Bergroth), but the key characters given by Horvath (1911) and notes by Drake & Hottes (1951) leave no doubt that *kenyana* is distinct from *strigipes*, the latter having a more hirsute and less punctate dorsum, proportionally longer third antennal segment, and more hirsute legs.



*Valleriola moesta* Horvath

*Valleriola moesta* Horvath, 1911. *Ann. Mus. Nat. Hungarici* 9: 363.

Originally described from Uganda, this species is widespread in Africa and also listed from Java. The favored habitats are large concrete or stone structure in large streams. When approached while resting on sloping stone surfaces, these insects flew readily and were difficult to capture. On the other hand, where they were found on vertical midstream concrete bridge structures they ran over the surface but rarely flew and could be collected in numbers.

*Material examined*: KENYA: 1 ♀, Kericho Dist., S. W. of Kericho, CL1664, II-4-1980, J. T. Polhemus; 3 ♂, 2 ♀, Machakos Dist., 14 falls, E. of Thika, CL1652, I-30-1980, J. T. Polhemus; 8 ♂, 2 ♀, Narok Dist., Mara River, Masai Mara Game Reserve, II-5-1980, J. T. Polhemus. SOUTH AFRICA: Cape Province: 15 ♂, 14 ♀, Cape Prov., Gamka River, W. of Oudtshoorn, CL972, II-23-1979, J. T. Polhemus; Transvaal: 1 ♀, Noordkaap River at Barberton, Nelspruit road, XI-7-1970, Stuckenberg. ZAMBIA: 1 ♀, W. of Lutale, CL1680, II-13-1980, J. T. Polhemus.

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